Flight

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE AERO CLUB OF THE UNITED KINGDOM.

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THE PRINCE OF WALES' VISIT TO THE AERO SHOW AT OLYMPIA LAST WEEK.—His Royal Highness is seen in our photograph examining the exhibits on Messrs. Short Bros.' stand.

Touching the Policy of Unification.

The wellnigh dramatic manner in which the subject of flight has come to bulk in the public view gives rise to the thought that the time has now come for defining the position of the various aeronautical bodies in these Islands. That there is need for a clear understanding on this matter is plain by the lesson we may learn from studying conditions abroad, where there is a woeful dissipation of effort and overlapping of purposes from want of what one might term a unification of policy.

Happily, in Britain the natural and logical position of affairs is quite easy to define. We may take the points to be pondered in order of the dates of establishment of the societies to be dealt with, as that will serve our purpose as well as any other method. First on the list stands the Aeronautical Society of Great Britain, which is the oldest association of its kind in the world, and was founded by the Duke of Argyll, Sir Charles Bright, Mr. James Glaisher, and others on January 12th, 1866, with the aim of fostering and developing aeronautics and aerology. Flight has need of such a soundly conducted scientific body, which is bound to go forward at a vastly more encouraging rate of progress now that the public has been furnished with proof of the possibility of human travel in the air.

Hand in hand with the scientific aspects of the subject go the sporting and social phases of it, for the incentive that will be given to the movement through the enterprise of sportsmen will serve to establish it on a wide and absolutely practical basis is a thing that is certain because there are parallels for it in the immediately preceding advent and founding of motorism. In the Aero Club of the United Kingdom, with its cosmopolitan and equally important offspring the Aero Club League, we have the only internationally recognised association of the sort, and one thoroughly well organised for taking entire charge of the sporting phases of flight. In the fulness of time, too, that body will come to stand in the same relation to the movement it fosters as the Royal Automobile Club does towards motorism. And to the Aero Club will fall the task of encouraging the practical side by organising and carrying out such official trials as it will be desirable to hold, that the healthy stimulus of competition may lead to faster progress, and that the public may be furnished with official data concerning the qualities of the various machines placed on the market.

Thirdly, an industry has need of an organisation devoted solely to its interests as a trade. Were those engaged in the business of building or selling flying machines at the moment to attempt to establish a society for this purpose they would be imposing a very heavy tax on themselves, while the practical result for some years to come could only be a body financially and numerically, therefore influentially, very weak. Happily, there is no need to engage in any such struggle. The Society of Motor Manufacturers and Traders, which is a wealthy and strongly-established body, has demonstrated in no unmistakable fashion that it intends to identify its own interests with those of aerial locomotion. This conclusion is no less natural than wise. Whether the craft be of the lighter-than-air or the heavier-than-air sort it requires to be equipped with a relatively light, powerful, and small engine of some sort. That is a vital piece of the mechanism of any machine designed for aerial locomotion, and the body which represents the makers and sellers of this class of engine is the Society of Motor Manufacturers and Traders. Therefore it has been inevitable that as its members automatically represent—shall we say one half?—of what industry of flight there may be the Society in question should have recognised the fact by guaranteeing expenses to the substantial sum of £5,000 to enable all and sundry to exhibit their devices for aerial locomotion under the most favourable circumstances and for the first time in worthy fashion in this country at the recent highly creditable Show at Olympia, Kensington.

Fourthly, there is what may be termed the department for propaganda. To put the matter bluntly, advertising flight in the insistent manner which will be needful to arouse the British nation to a reasonably likely sense of its importance if we are to take our due part in the development of a science, as well for our own credit as for our safety's sake, is scarcely within the province either of the scientific Aeronautical Society of Great Britain, or of the Aero Club of the United Kingdom and its League, that stands for the sporting, competitive and social sides of flight, or of the Society of Motor Manufacturers and Traders, that is so admirably constituted to take charge of its business developments. Therefore, the Aerial League of the British Empire has been established, and there is need of such a body provided it be run on proper lines. On this point we have been making some careful investigations, and are satisfied that so far the League is worthy of support. It does not aim at fulfilling a social function of any sort, the sole object of its existence being to win recruits and to instruct them when they shall have been won. We are assured that anything whatsoever in the nature of trading will be studiously and absolutely avoided. All funds of the League are to be placed in the hands of trustees, whose names are familiar to the public as men whose integrity is beyond question. Undoubtedly, there is much valuable and arduous work to be done in the way of lecturing. The Aerial League of the British Empire aims at undertaking that task, while among other of its schemes is the establishment of a college for technical training in regard to all matters pertaining to aerial locomotion. Whether this will be found practicable it is impossible to determine at this early date. Whether it is or not, however, is a matter of secondary importance in view of the self-evident fact that there is good work in plenty for a body designed on the same lines as the Navy League and having a patriotic purpose only as distinct from a political one.

Having outlined the four departments into which the promotion of the science of aerial navigation naturally falls, and having named as many bodies organised especially to deal one with each of those phases, we advance a plea for unification of purpose by way of mutual recognition of spheres of utility and influence, of the utter undesirability of aught in the guise of rivalry, and of the needlessness for allowing any other Richmond in the field. Doubtless there will be troubles from time to time, even as there are in the history of all movements to which it is worth the while of men of intellect and stamina to devote their lives; but when the advocates of a cause have a mutual understanding such as amounts practically to a unification of policy, there is no need to be discouraged as to the future. As Mr. H. G. Pelissier humorously expresses it in one of his merry songs :—

"Since aeroplanes went up to see,
"Wilbur Wright has written me,
"That
"There's a sun still shining in the sky."

AERO-MOTORS AT OLYMPIA.

ALTHOUGH perhaps that section of the public who are not motorists may pass by the aero-motors at Olympia with comparatively little attention, there can be no doubt whatever that the motoring community and those actively interested in flight, fully appreciated the fascination of their variety. Never has there been an exhibition at which such an interesting collection of internal-combustion engines has been on view, and the fact that this has occurred at a comparatively late stage in the automobile movement—when designers with original ideas have had the advantage of modern manufacturing facilities—has given an incalculably greater value to the collective display.

There are no fewer than seventeen different makes of aero-motors on view, five of which represent British production. Some, like the Metallurgique and Vivinus, are based directly upon the automobile practice of their respective firms, and externally at all events are indistinguishable from the orthodox 4-cyl. vertical motor car engine. The Green aero-motor, which belongs to the same broad category, is, however, more uncommon in the design of its detail. Another class, which is most extensively represented, includes those engines which have their cylinders arranged V-fashion, so as to economise the space occupied and reduce the weight. In this class may be mentioned the Wolseley, Simms, E.N.V., Pipe, and Renault motors. A still further shortening of the overall length is obtained by those who adopt the radial arrangement of the cylinders, of which the Gobron and Miesse are examples. They belong, however, to a sub-section of the class, inasmuch as their cylinders are arranged in two planes instead of wholly in the same plane, as is the characteristic of the radial system pure and simple. Another modified form of the radial principle is that represented by the engines which we have, for the sake of conciseness, designated "semi-radial," by which term we imply that the cylinders project radially from the crank-chamber, but are all situated above the crank-shaft, in order to avoid those difficulties in connection with lubrication which are generally supposed to be associated with cylinders placed in an inverted position. It is to this category that the R.E.P. engine belongs. From the arrangement of the cylinders in a vertical plane the general classification of aero-motors passes to the class which has horizontal cylinders, of which the Dutheil-Chalmers and also the Miesse are examples. In one of its two types the former motor also possesses the peculiarity of having two crank-shafts, but this latter model is not on view.

While it is accepted practice for light internal combustion engines of the kind used on flying machines to operate on the four-cycle principle as they do on motor cars, there is not wanting an abiding interest in the two-stroke engine, nor does Olympia lack a practical example of its construction. In adopting the two-stroke principle for their aero-motor, the N.E.C. Co. have introduced a distinctly original feature in the form of internal air-cooling, and the measure of success which their bold departure achieves will assuredly be watched with the greatest interest by all. There have been many attempts and many failures to get the right thing in two-stroke engines, but the subject has never lost its fascination to the inventive mind, and the engine itself in its elementary form has characteristics which essentially endear it to the eye of the practical user. In the first place it has no valves, for the mixture enters and leaves the cylinders through ports cut in the cylinder walls which are uncovered by the piston itself. With the absence of the valves there is, of course, the abolition of the operating mechanism, including the cam-shafts, but in order to obtain the major advantages of the principle, it is not always practicable to avoid the introduction of supplementary mechanism in some degree, even though it may be of a far simpler and less expensive character. Then, again, the two-cycle principle, by providing an explosion every revolution instead of every two revolutions, virtually doubles the number of cylinders; that is to say, a 4-cyl. two-stroke engine produces a torque on the crank-shaft, the evenness of which would be comparable with the results expected from an 8-cyl. engine working on the four-stroke cycle of operations. With this increase of smooth running there is an increase in power for the same cylinder dimensions, but there is not, as might be imagined, an actual doubling of the horse-power as the result of having twice the number of explosions in a given period. Other factors interfere

AERO-MOTORS AT OLYMPIA.

h.p.	Make.	Cooling.	Cylinders.	Bore.	Stroke.	R.p.m.	Weight.	Lbs., h.p.	Price.	Guarantee.
							lbs.		£	hrs.
	British.									
50	Wolseley	W	8	3⅜	5	1350	300	6·0	600	4
20	N.E.C.	A	2	4½	4	1500	—	—	—	4
40	,, ...	A	4	4½	4	1500	290	7¼	250	4
60	,, ...	A	6	4½	4	1500	—	—	—	4
30	Green	W	4	105	120	1200	160	5·3	265	3
50	,, ...	W	4	5½	5⅜	1100	236	4·7	365	3
80	,, ...	W	8	116	140	1100	—	—	—	3
50	Simms (Aero Motors)	W	6	110	110	1000	220	4·4	450	3
12	International Rotary ...	A	2	2⅜	2½	1500	60	5·0	53	S
25	,, ...	A	4	3¼	2½	1500	80	3·2	105	S
50	,, ...	A	6	5	4	1500	130	3·0	210	S
50	,, ...	—	8	4	3	1500	—	—	—	—
	Foreign.									
25	Metallurgique	W	4	3	110	1850	—	—	180	4
40	,, ...	W	4	85	130	1850	—	—	250	4
60	,, ...	W	4	4	150	1850	300	5·0	425	4
90	,, ...	W	4	5	152	1600	550	6·1	550	4
80	E.N.V. (London and Parisian M. Co.)	W	8	100	130	1000	300	3·7	—	5
70	Pipe (London Motor Garage)	A	8	100	100	1950	289	4·1	600	—
50	Renault	A	8	90	120	1600	264	5·3	520	—
75	Gobron	W	8	90	160	1400	330	4·4	500	—
130	Miesse	A	8	130	130	1200	245	1·9	—	2
18	Dutheil-Chalmers ...	A	2	125	100	1200	56	3·1	150	1
20	,, ...	W	2	125	120	1200	150	7·5	180	12
40	,, ...	W	4	125	120	1200	250	6·2	320	12
60	,, ...	W	6	125	120	1200	350	5·8	440	12
50	Gnome (Gauthier) ...	A	7	110	120	1200	165	3·3	400	5
100	,, ...	A	14	110	120	1200	220	2·2	720	5
20	R.E.P. (Bessler, W.)...	A	5	85	95	1400	115	5·7	320	3
30	,, ...	A	7	85	95	1400	150	5·0	440	3
40	,, ...	A	10	85	95	1400	216	5·4	560	3
50	Vivinus (Erade, Van Toll)	W	4	106	120	1600	—	—	240	12
60	,, ...	W	4	112	130	1600	336	5·6	280	12
70	,, ...	W	4	115	130	1800	280	4·0	320	12
1¼	Ripault...	W	1	50	70	3500	8	6·4	16	12
1⅜	,, ...	A	1	65	65	1800	—	—	16	—
15	Tani	A	—	—	—	10000	15	1·0	—	—

Cooling:—A = Air; W = Water.
Guarantee:—Hours for which engine will maintain specified h.p. at specified r.p m.
S = To satisfaction of purchaser.

with the realisation of such a wholly satisfactory result, but although it is mainly on the score of smooth running and simplicity that the two-stroke engine aims at gaining its laurels, there is, or at any rate there should be, a very appreciable increase in the power available from a given weight. In the case of the new N.E.C. aero-motor, the manufacturers state that they have secured about 25 per cent. more horse-power than they have been accustomed to obtain from four-stroke engines of the same dimensions.

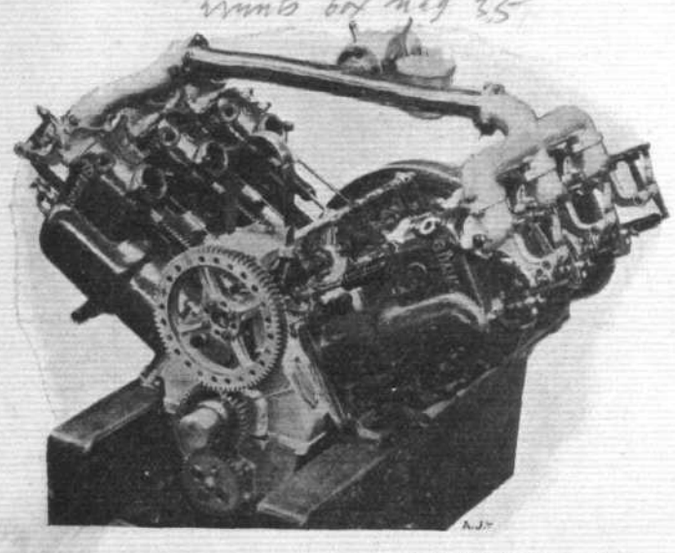
All the types which have been mentioned hitherto belong to the same main category of stationary engines, that is to say engines which have their cylinders and base-chamber rigidly supported on the frame of the flyer while their crank-shafts revolve to operate the propeller. There is, however, the opposite principle to this, viz., the system in which the crank-shaft is held stationary while the cylinders revolve round it. Two main advantages are claimed by the adherents of this method of operation, one being that use is made of the otherwise dead weight of the cylinders by virtue of their fly-wheel effect when revolving, and the other claim is that, while revolving, their passage through the air creates a sufficient cooling effect upon the walls to enable water-cooling to be dispensed with. It is to the rotary class that the Gnome engine and International Rotary motor belong, the former being also a pure example of the radial system of construction. In one of its two types the International Rotary motor possesses the peculiarity of having a rotating crank-shaft as well as rotating cylinders, the two members revolving, of course, in opposite directions, and at half speed. The extreme development of the rotary principle is, of course, the turbine, and an example is not lacking even of this unusual class, although the little Tani model is perhaps scarcely convincing in its present state.

In an accompanying table we summarise the leading dimensions and particulars relating to the aero-motors on view, and in order to make the table as complete as possible we have also included the full range of models manufactured by each exhibitor, even where an example of each size is not actually there. In addition to the price, it will be noticed that a column is included to show the nature of the guarantee, and the figures therein indicate the number of hours that the manufacturers are prepared to guarantee that their engines shall maintain the specified horse-power at the specified speed. Although every effort was made to obtain the correct weight for each engine, the information available is not always based on actual weigh-bridge figures, and it is, therefore, impossible to say for certain that these weights are exact in all cases. Commencing this week, we now proceed, having thus briefly summarised the exhibits collectively, to describe in greater detail the characteristics and leading features of each individual make of aerial engine at the Show.

LEADING AERO-MOTORS ILLUSTRATED AND DESCRIBED.

Simms (Aero Motors, Ltd.).

V-type engine, peculiar in its class for having six cylinders, whereas the majority have eight. The cylinders are cast separately, but each is complete with its valve-chamber and water-jacket; the cylinders are bolted to a



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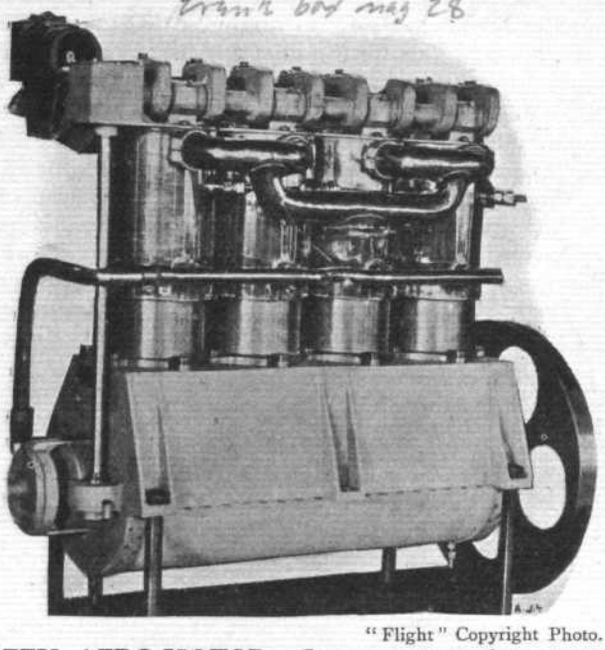
SIMMS AERO-MOTOR.—This 6-cyl. V-type engine is fitted with Phillips' auto-mechanical inlet-valves.

magnaleum base-chamber. The cam-shaft lies longitudinally above the crank-chamber, between the cylinders, and is exposed, as also are the gear-wheels which drive it; the half-speed gear-wheel is made of magnaleum and fibre and weighs only 7 ozs. In spite of being arranged externally and exposed, the cam-shaft bearings are lubricated under pressure in the same way as the crank-shaft. Another special feature is the use of Phillips' "auto-mechanical" inlet-valves. These valves, as readers of *The Automotor Journal* are aware, are a combination of the mechanically-operated and the atmospheric types, the mechanical control being employed to relieve the pressure on the valve-spring for a certain predetermined period, during which the valve is free to open under atmospheric pressure. If at the end of this period it has not opened of its own accord, it is positively lifted from its seat. The closing of the valve takes place in a similar manner.

Green (Green's Motor Patents, Ltd.).

Of the three standard models—designed by Mr. Green and constructed by Messrs. Aster—two are vertical 4-cyl. engines, while the other is an 8-cyl. V-type engine. All operate on the four-stroke cycle, and embody the same constructional features which in many cases are quite original, and in all instances have been very carefully thought out. The cylinders are separate steel castings machined all over so as to be as far as possible of even thickness, and to thereby give regular expansion and contraction. They have copper water-jackets, which are pressed from the solid sheet metal, and are fastened in place in a special manner which is one of the features of the Green engine. These copper jackets are simple cylindrical covers open at one end and closed at the other. At their open ends they are slightly bell-mouthed, so that each can slide easily into its place over a rubber ring which is carried in a grooved flange on the cylinder casting. This ring forms a water-joint, and at the same time that it prevents leakage it allows the copper jacket to expand and contract independently of the cylinder. Above the cylinder head, the water-jacket joint is formed by

direct pressure of the copper upon supporting collars, which are provided as an abutment round the cylindrical valve-chambers which project above the cylinder head. Similarly, in connection with the joints round the ports for the induction and exhaust pipes, which are made tight by the use of flanged ferrules. Owing to this method of construction a damaged jacket can at any time be removed and replaced without difficulty, as the joints can be made and re-made without losing anything of their original security. Another important point, too, is that the sheet copper being quite thin is likely to merely bulge instead of bursting should the water in the jackets freeze, and indeed this has already happened, when, on the occasion in question, the jackets were not only unbroken but remained in a sufficiently good condition to enable the engine to be run after an artificial thaw.



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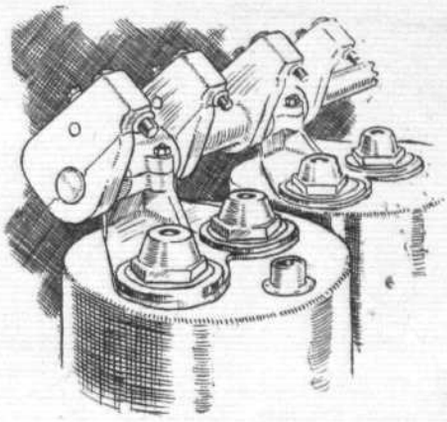
GREEN AERO-MOTOR.—Copper water-jackets, provided with sliding expansion-joints, are employed, and many other original details have been embodied into the design of this engine, which is otherwise of the orthodox 4-cyl. vertical type.

"Flight" Copyright Photo.

Green Aero-Motor.—View showing the component parts of which a cylinder is built up. The copper jacket is fastened by the ferrules and nuts shown separately, and at its lower end makes a sliding joint over a rubber ring held in the grooved flange on the cylinder casting.

The valves remove complete with their cages and seatings, and the valve-springs and stems are neatly enclosed under aluminium domes, which incidentally form the locking nuts that make the water joint at the upper end of the cylinder jacket. Another interesting point about the valves is that their stems are turned with a thick and a thin diameter, in order that, should a valve-stem break, the fracture will occur somewhere in the thin part, thereby leaving the thicker portion of the stem which is adjacent to the valve-head still inside its guide when the valve drops. This little precaution is designed to ensure that a ridge on the cylinder casting, which is provided for the purpose, shall invariably prevent a broken valve from dropping into the cylinder. A single overhead cam-shaft is employed to operate the valves through rock-levers, which are themselves enclosed in oil-tight casings, and are so mounted that the whole casing can be hinged back out of the way when a valve has to be removed.



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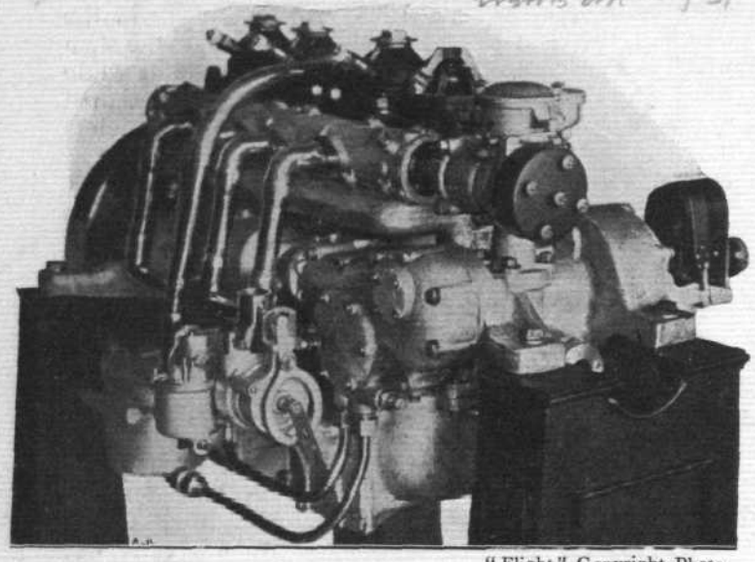
Green Aero-Motor.—Sketch showing how the rock-levers hinge back upon the cam-shaft to enable the valves to be removed.

The cam-shaft itself is driven by skew gearing from a vertical shaft, which is itself skew-gear-driven from a wheel on the crank-shaft. Although not so arranged on the model exhibited, the proper position for this vertical shaft is between the second and third cylinders, where it performs the supplementary duty of driving a transverse shaft passing through the crank-chamber between the second and third cranks. On opposite ends of this transverse shaft are the magneto and circulating-pump, and on the bottom end of the vertical shaft is the oil-pump. The crank-shaft itself is supported in five bearings, having a total length of 1 foot. The bearings are independently capped and the bolts pass right through the crank-chamber and the cylinder-flanges. It is these same bolts which hold the cylinders to the aluminium base-chamber. The lower half of the base-chamber, which is an oil sump, is formed by a light sheet of aluminium. The cylinders are slightly *desaxé*.

N.E.C. (New Engine Motor Co.).

The New Motor Engine Co. have introduced a two-cycle engine embodying the new principle of internal air cooling, whereby a fan is employed to maintain a blast of cooling air through the cylinder during the last half of each working stroke. The stroke is 4 ins., and the exhaust ports open when the piston has travelled half-way, the exhaust discharging through the usual pipe into the silencer. When the exhaust port has been open about $\frac{1}{4}$-in. the inlet ports commence to uncover and the air blast is admitted, driving out what happens to be left of the products of the combustion. This air blast remains in action during the rest of the stroke in order to internally cool the cylinders, which it is enabled all the more effectively to do because it comes directly into contact with the hottest members, including the pistons. The hot air is blown out through a continuation of the exhaust ports into a large aluminium chamber which surrounds the cylinders and has an exit direct to the atmosphere. As the piston returns the inlet ports begin

to close, and at the last moment a charge of very rich mixture is admitted to the induction pipe by a rotary valve. This charge mixes with the air already in the cylinder, and is compressed and exploded in the usual way. As the cylinder is already full of air the problem of retaining a full charge at all speeds, which is a common difficulty in ordinary two-cycle practice, takes on a very different aspect, and the question in the N.E.C. motor mainly resolves itself into a suitable method of regulating the richness of the charge which is admitted. The rich mixture is prepared by the aid of a simple double-acting pump which sucks the air through the carburettor and delivers it at the appointed time to the cylinder.



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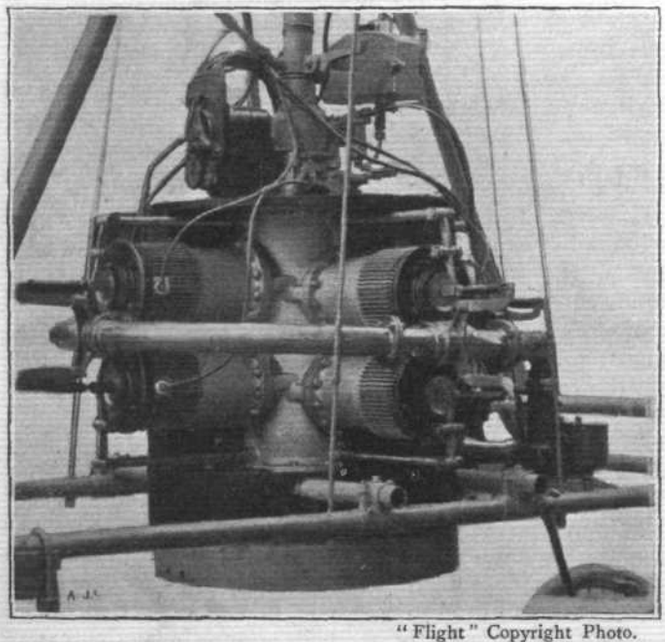
N.E.C. TWO-STROKE ENGINE.—General view of the interesting new motor designed by the N.E.C. Co. Its most important and original feature is the use of internal air-cooling by means of an air blast directed into the cylinder itself.

Miesse (Miesse Petrol Car Syndicate).

Eight-cylinder radial engine, having the cylinders arranged in pairs and in an horizontal position. The crank-shaft is vertical, and has two cranks, to each of which the four connecting-rods of the cylinders occupying that plane are connected. A special feature of the construction is the use of combined inlet and exhaust-valves, both of which are operated mechanically and by the same tappet-rod, the cam mechanism being so arranged that the stroke of the tappet-rod differs for the inlet and the exhaust. The cylinders are air-cooled, and for this purpose they are partially enclosed in a cylindrical casing which contains a fan mounted on the bottom end of the crank-shaft. Being radial, the cylinders are ribbed longitudinally to allow the air to pass over them into the casing when the fan is at work. High-tension magneto ignition is provided by means of a magneto mounted on the upper end of the casing, where it is bevel-gear driven from the crank-shaft. A single Zenith carburettor is employed to feed all the eight cylinders.



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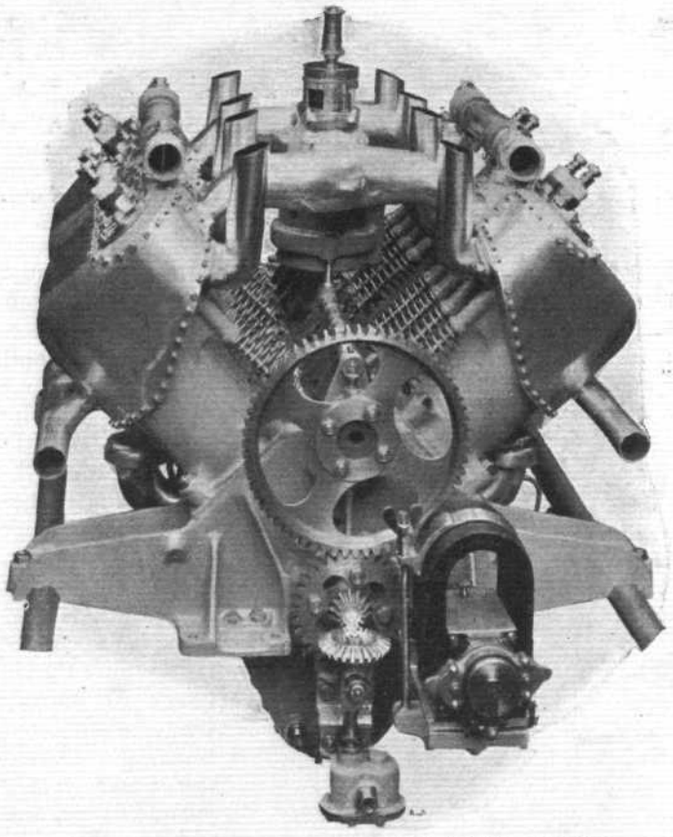
MIESSE AERO-MOTOR.—View of the engine in place on the De la Hault flapping-wing machine. Part of the casing which assists in the air cooling has been removed to expose two pairs of cylinders.

Wolseley (Wolseley Tool and Motor Co.).

Eight-cylinder V-type engine, specially designed with an external cam-shaft and gear mechanism for the sake of increased accessibility. The water-jackets are partly made of aluminium for the sake of lightness, and the water-pipes and induction-pipes are wholly made of this metal. The method of fastening the water-jackets is an interesting constructional detail; it is carried out in the same manner as on the 200-h.p. marine engine, with which the Wolseley Co. equipped the Duke of Westminster's racing motor boat "Wolseley-Siddeley." The aluminium is beaten to shape, and is very neatly fastened to the cylinder casting by a row of screws. In the immediate vicinity of the valve-chambers the cylinder casting is extended to form the wall of its own water-



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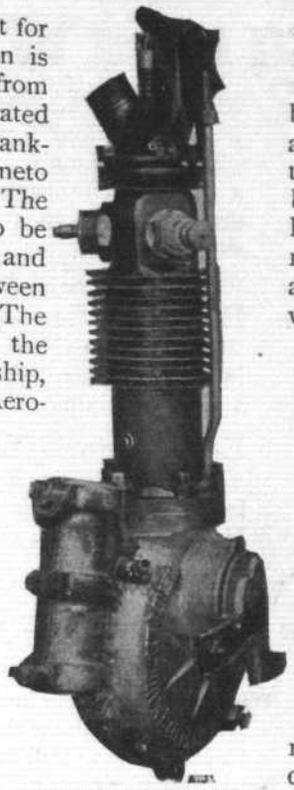
WOLSELEY AERO-MOTOR.—End view, showing the gearing for the cam-shaft, magneto and oil-pump. The fastening of the aluminium water-jackets to the cylinders is a special detail of the construction prominently shown in the above illustration.

jacket, and to provide an attachment for the aluminium-jackets. Lubrication is effected on the forced-feed principle from a gear-wheel pump, which is operated by exposed bevel-gearing from the crank-shaft. Alongside the pump is a magneto mounted on a detachable bracket. The valves are arranged together so as to be operated from a single cam-shaft, and short rock-levers are introduced between the valve-stems and the cams. The motor, which is constructed with the Wolseley Co.'s accustomed workmanship, has been built to the order of the Aeroplane Construction Co., who will shortly instal it in a flyer which they are building for trials in England.



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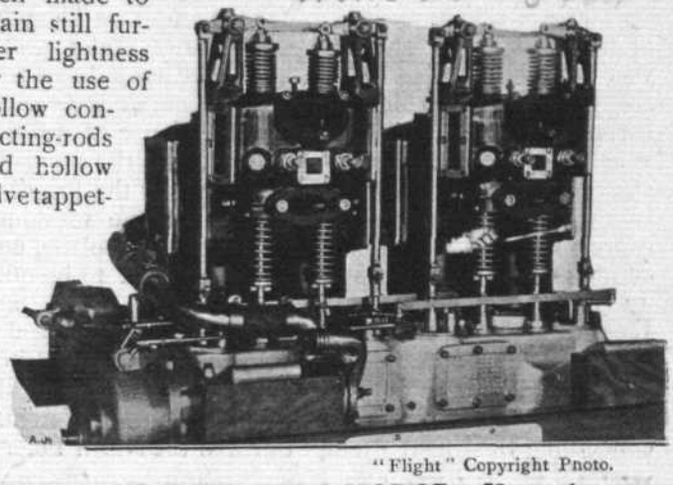
Ripault Motor.—View of the air-cooled model. Another model, also of 1¼-h.p., is made with a cylinder-jacket for water cooling, and is specially designed for experimental work.

Ripault (Leo Ripault and Co.).

Small single-cylinder engine developing 1¼-h.p., specially constructed with a water-jacket instead of air-cooling in order to ensure sustained output without overheating during experimental work. This little engine, which is very light, has an aluminium crank-chamber, and is designed for use on models, and in other flight experiments, which only require a small amount of power.

Metallurgique (Warwick Wright, Ltd.).

Four-cylinder vertical engine with its cylinders cast in pairs on the same lines as the well-known Metallurgique car engine. The exhaust-valves are arranged over the inlet-valves and the crank and cam-shafts are considerably off-set (*desaxé*). Every feature which has made the Metallurgique engine so successful as a high-powered motor for cars has been retained, and special efforts have been made to attain still further lightness by the use of hollow connecting-rods and hollow valve tappet-rods; the workmanship is, of course, of the same high quality as that which the Metallurgique firm put into their construction throughout. A most important new feature in the aero-motor is the introduction of an exceedingly high-pressure forced-feed system of lubrication, the outside bearings of the crank-shaft being constructed to withstand a pressure of 90 lbs. per sq. in. without leaking. At present the smallest model, which has a bore of 3 ins., is not being constructed specially light for flight experiments as it is hardly so suitable for the purpose as the larger sizes.



"Flight" Copyright Photo.

METALLURGIQUE AERO-MOTOR.—View showing the arrangement of the valves. The tappet-rods operating the overhead valves are hollow, as also are the main connecting-rods.

(*To be continued.*)

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AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

A meeting of the Committee was held on Tuesday, March 30th, at 166, Piccadilly, W., when there were present: Mr. Roger W. Wallace, K.C., in the chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Mr. Martin Dale, Prof. A. K. Huntington, Mr. V. Ker-Seymer, Mr. C. F. Pollock, Mr. Stanley Spooner, H. E. Perrin (Sec.).

New Members.

The following new Members were elected:—

John Edward Austin.
John Moncrieff Dick.
H. Godsal.
Geofrey Harley.
W. O. Manning.
William H. Milburn.
Col. the Hon. G. Napier.
Sir Henry Norman, M.P.
Charles R. Park.

Aero Club League. Model Exhibit.

The Committee of the Aero Club have awarded bronze medals to the following exhibitors of models at the recent Aero Exhibition at Olympia:—

H. Blackburn, 3, Elm Place, South Kensington, S.W.
T. W. K. Clarke, 14, Union Street, Kingston-on-Thames.
Josef Deixler, The Hague, Holland.
C. P. Foster, Vale View, Matlock.
W. F. Howard, 18, Egerton Gardens, Ealing, W.
Montford Kay, 100, Hawkesley Road, Stoke Newington, N.
Alfred P. Maxfield, 171, Highfield Road, Saltby, Birmingham.
Phillips and Walters, 86, South End, Croydon.
Harold Piffard, 18, Addison Road, Bedford Park, W.
G. H. Pointer, The Studio, Colville Houses, Bayswater, W.
R. W. Taylor, 7, Silfield Terrace, King's Lynn.
J. D. M. Tinline, Cliffden, Teignmouth, Devon.
H. Burge Webb, 47D, Handsworth Road, Philip Lane, South Tottenham.
E. A. Whitby, 23, Rood Lane, E.C.

English Michelin Cup.

The Committee of the Aero Club have accepted the offer of the Michelin Tyre Co. to present a Trophy of £500, carrying with it an annual cash prize of £500 for five years. The competition is open to British subjects, manipulating a British-made flying machine, but in the first year the motor may be of foreign manufacture. The radiator and propellers must, however, be British made.

The competition will be open on April 30th, and full rules will be published shortly.

Aero Laboratory.

The Committee of the Aero Club have under consideration the formation of an Aero Laboratory, and full particulars will be announced at a later date. The Committee will welcome any suggestions on the subject.

The Marquis de Mouzilly St. Mars has presented a Cup to the Aero Club for flying machines, the rules for which are now under consideration.

HAROLD E. PERRIN, Secretary.

166, Piccadilly, W.

News of the Week.

Royalty at Olympia.

Those who happened to be at Olympia on Thursday of last week, when H.R.H. the Prince of Wales paid a visit to the Aero Show at Olympia, could not fail to notice the keen interest which the Prince took in the various aeroplanes, and the insight into the science of aviation which His Royal Highness displayed. At the stands he stopped at, many questions were asked by the Prince as to the relative weights and powers of the machines, especially as compared with the Wright aeroplane, concerning which His Royal Highness seemed to be quite *au fait*. The Moore-Brabazon, Short Bros.', and Howard Wright aeroplanes came in for a good deal of attention, the two latter especially, as they were British built; and the Wellman airship was also critically examined, and several queries addressed to Mr. Vaniman concerning their next attempt to reach the North Pole.

Wright Pupils' Flights.

Exact official times for the longest flights of Count Lambert and M. Tissandier on their Wright machines mentioned last week are as follows:—M. Paul Tissandier 25·25 kiloms. in 27m. 59s., and Count Lambert for the same distance 27m. 11s., each pupil therefore securing a "250-Metre Prize," founded by the Aero Club de France for encouraging new pilots. Several fresh flights have since been made by both pupils, each successive essay demonstrating the perfect control which they have acquired in the short period of their tuition. Moreover, flights of two hours or more M. Tissandier boldly claims could be made by either of them if they so elected, but under promise to Wilbur Wright, they are taking no risks, but rather continuing to make progress slowly until their proficiency is beyond all doubt. The several aviation prizes at Monaco to be won will, however, shortly come into the reckoning of these leaders in flight.

Wright Flyers and Italy.

This week, following a series of functions at Le Mans, given in honour of the Brothers Wright by the Aero Club de la Sarthe, M. Leon Bollee, &c., Orville Wright and his sister were to travel to Italy, there to join Wilbur for the commencing of his lessons in flying, as already announced. A hangar has been erected at Centocelle, near Rome, whither the American assistants of Wilbur Wright had previously transported one of the flyers in readiness for their chief. Lachapelle, the French assistant, remains at Pau with MM. Lambert and Tissandier.

Erstwhile Pupil Becomes Instructor.

Although it is only comparatively a short time since M. Paul Tissandier was accepted as a pupil by Wilbur Wright, he is now quite a professor in the art of flying. He has already secured two pupils, M. Alfred Leblanc and M. Rene Gasnier, and their tuition will commence in a few days. M. Gasnier, it will be remembered, has already made some successful flights with the Voisin type of aeroplane.

Mr. Hubert Latham Progresses.

At Chalons Camp Mr. Latham has been practising with "Antoinette IV," and succeeded in flying over a kilom. Unfortunately an unexpected squall of wind drove him into the trees last week, resulting in the two wings being damaged. He hopes to add his name this week to the roll of winners of the "250 Metres Prize."

Rougier at Issy.

Using a Farman type biplane, Rougier is now installed at Issy, where he is constantly practising with a view to joining the ranks of qualified pilots.

Esnault-Pelterie Teaching in Russia.

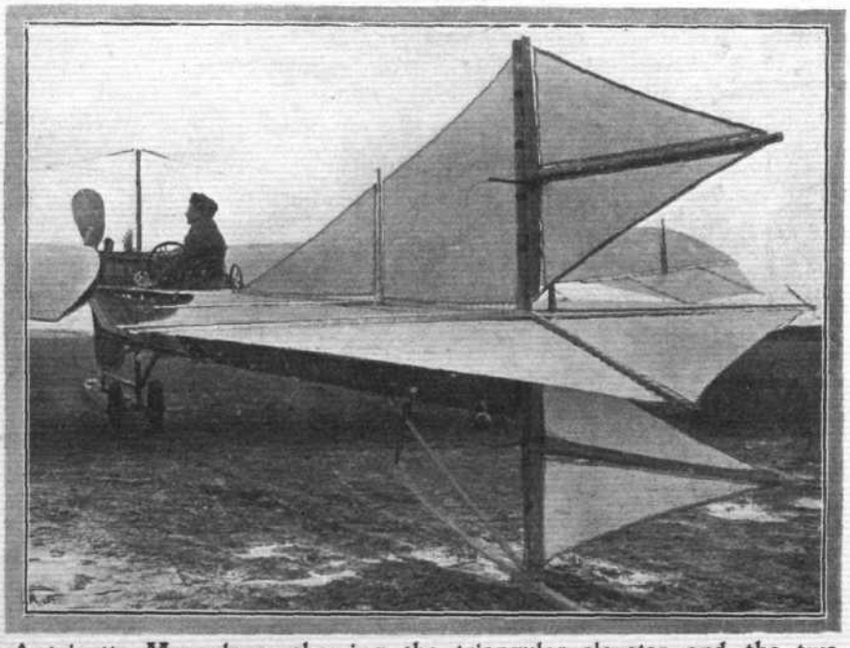
M. Robert Esnault-Pelterie has given three lectures at St. Petersburg—one before the Army and Navy Club, a second at the Academy of Military Engineers, and the third at Tsarskoye-Selo by command of the Czar—M. Pelterie being at its conclusion decorated by the Emperor with the Order of Saint Anne.

Flight in Canada.

On Saturday last, Dr. Graham Bell, the head of the Aerial Experiment Association, delivered a lecture before the Canadian Club at Ottawa, and asked the Government to assist them to continue their aerial experiments. Subsequently, Mr. Fielding, the Minister of Finance, intimated that an effort would be made to retain the services of Mr. Douglas McCurdy and Mr. Baldwin for the Empire. Earl Grey, who also spoke, said he felt confident that England would be as supreme in the air as on the sea, and he was satisfied that the machine which would enable the Empire to maintain that supremacy would be contributed by Canada.

Prizes for Aero Models.

In the official notices of the Aero Club this week (page 197) particulars are given of the awards which have been made in connection with the Model Exhibition at Olympia, organised by the Aero Club League. Our own illustrated article on this section of the Show will appear in due course.



Antoinette Monoplane, showing the triangular elevator and the two triangular rudders in position for turning to the right and for ascending.

"Zeppelin" Damaged, and an Exciting Adventure.

Last week it was intended to make a voyage with the "Zeppelin" to Munich, covering the 165 kiloms. in one stage. A damaged propeller, however, upset the arrangements and the journey was postponed, especially as exceptionally bad weather was foretold by the Meteorological Office.

At 4.5 a.m. on Thursday this week in dull, windy weather, a start was made with Count Zeppelin, Major Sperling, three officers and the crew on board. In order to guide the voyagers, the railway station lights were left burning, whilst at the towns and villages along the route bells were rung to apprise the approach of the airship. The Exhibition Hall at Munich was reached by 9 a.m., the most enthusiastic acclamations being accorded the aeronauts. After dipping her bow three times to the Prince Regent, the airship rose almost with a dart 300 ft., and sailed off broadside to the Town Hall towards the Palace, where Princess Maria Therese and her daughter greeted Count Zeppelin and his companions from the roof of the Georgenkapelle. Then an attempt was made to land at the Oberwiesenfeld Parade Ground, but unfortunately a violent south-west wind prevented it being executed, and the airship, buffeted by the semi-hurricane, was driven away towards Oberfoehring. Assistance was at once despatched, both by railway and by road, but by skilful handling Count Zeppelin safely landed his craft at Meder Vielbach, near Dingolfing, about 3 p.m.

C.A.M. Inspect Brescia Circuit.

At the invitation of the municipal authorities of Brescia, a party of delegates of the Commission Aérienne Mixte arrived in Milan on Sunday last, and on Monday inspected the ground at Brescia, over which it is proposed to hold the aeroplane competitions in August and September next. The delegates included MM. Archdeacon, Bleriot, G. de Castillon, Ernest Zens, A. Leblanc, Gasnier, and Paul Rousseau. They were afterwards entertained at a banquet in Milan, presided over by Senator Mangelli and the Mayor of Brescia.

The Brescia Circuit.

The course is about 12 kiloms. from Brescia, and is on an open plain, crossed by several ditches bordered by young trees. It will take the form of a rectangle measuring 10 kiloms. round and will have to be covered ten times. The Italian Elimination Trials will be held from August 1st to 20th, and the race itself between September 1st to 20th. There will be three prizes of a value of £4,000, the first being of a value of about £1,600. The entrance fee is 1,000 lire (£40), which will be returned to those who actually compete.

In addition to the race, altitude and endurance competitions will be organised.

An Indian Aeroplane.

From India we have received an interesting photograph, which we reproduce on this page. It is sent by Engineer O. H. Drewet, of the Sarpukuria and Asansol Collieries, Ltd, Asansol, who writes as follows, under the date of March 10th:—

"Herewith I forward a photograph of my aeroplane, which was taken after it smashed. I started down an inclined railway on top of a truck, and had scarcely gone 100 yards when the machine left the truck with me on board, and flew a distance of 20 yards. Unfortunately I had no motor, or would have made a much longer flight. I had twenty witnesses at my experiment."

Aeroplanes to be Blessed.

It has been no very uncommon thing to record in the past the blessing of motor cars by the Roman Church in France. Apparently the same procedure in some quarters is to be followed in regard to flying machines, as a formal gathering this week took place on April 1st at the invitation of the Compagnie d'Aviation at Juvisy, when benediction was pronounced by the Archbishop of Paris and the Bishop of Versailles over the aerodrome of the above-named company, and incidentally over the flyers which happened to be there at the time. We await with curiosity the name of the special Saint under whose protection aeroplanes have been placed.

A Vichy Aerodrome.

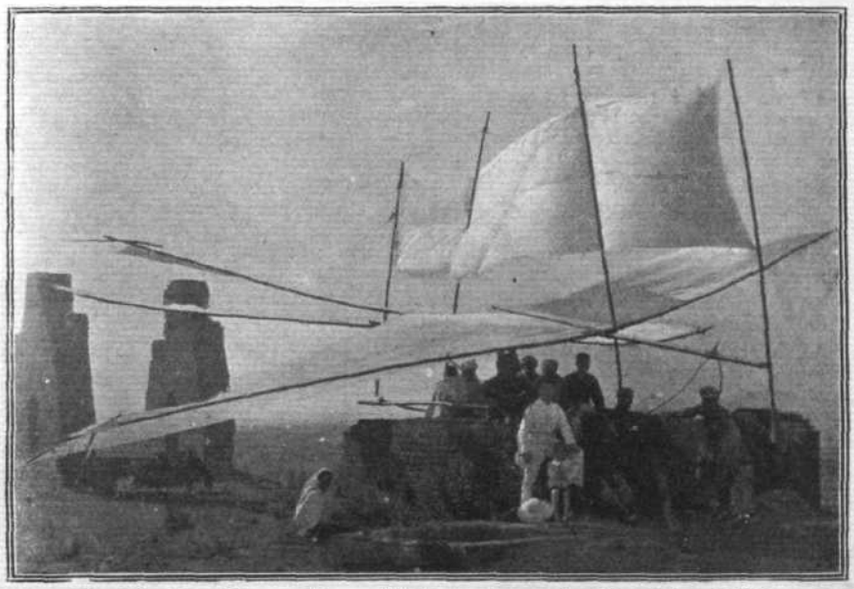
An aerodrome of 100 hectares in extent, situated at Abrest, about 1 kilom. from Vichy, is being established by the Vichy Aero Club. It is to be ready in May.

A New Bayard-Clement Airship.

Russia having acquired the first Clement-Bayard dirigible, M. Clement is already well forward with the plans for "Clement-Bayard No. 2." This will be of much more ambitious dimensions than its predecessor, the gas-bag having a capacity of 6,500 cubic metres. A new hangar, 100 metres long and 27 metres high, will accommodate this leviathan.

M. Faure is Unfortunate.

Upon his first attempt at flight at Monaco with his rebuilt Malecot dirigible balloon, M. Jacques Faure had a somewhat unpleasant experience. After making three circuits of the bay, M. Faure endeavoured to pass over the Oceanographical Museum, which stands on the rocks, without loss of ballast, simply by manipulating the planes and accelerating the engine. The propeller, however, struck the roof of the Museum and the machine was rendered unmanageable. The mechanicien, André, stopped the engine and then, on the advice of M. Faure, jumped into the sea, where he was picked up by a motor boat. M. Faure remained on his airship, and was afterwards towed ashore, little the worse for the *contre-temps*, and throughout the incident he displayed the utmost presence of mind.



First Indian Flyer, after a flight at Asansol, March 1st, 1909.

Dirigibles in Collision.

ACCORDING to a correspondent of the *Daily Express* at Vienna, an extraordinary accident occurred on Monday over the aviation ground at Linz. The Archduke Joseph Ferdinand was testing a new dirigible balloon, and in order to compare its performance with other airships, arranged with Count A. von Sternberg to make a simultaneous ascent with his dirigible. The two airships rose to a height of about 200 ft., when they were seen to rush towards one another and come into collision with a violent shock. Neither vessel sustained any serious injury, but they were locked together and it was impossible to separate them until they descended at Tulla five hours later.

Movable Aerodock.

EXPERIMENTS have been successfully carried out near Berlin with a new form of movable aerodock for airships, upon a principle devised by the Minister of War. It is in the form of a huge tent, and is said to be quite easily erected and struck in a very short time for transporting to the required scene of action.

Gordon-Bennett Balloon Cup.

THE date for the start of this event has been brought forward a week, and October 3rd is now officially announced as the date decided upon. Among the events to be organised by the Swiss Aero Club in connection with this race, will be a landing competition, to take place probably on October 1st.

Magnetos for Flyers.

As showing that the aeroplane business is becoming tangible already, we hear from United Motor Industries that Messrs. Eisemann have recently received one order for twenty-seven of their tension magnetos for aeroplane work. One of these aeroplane Eisemann magnetos, similar to that used on the Wright machine, was exhibited by them at the Aeronautical Show at Olympia.

Clerk of the Weather A.D. 2,000.

AMONG the novelists who have recognised in matters aerial an opportunity to thicken their plots, must be numbered Mr. Rudyard Kipling. In the American edition of his work, "With the Night Mail," he has added a chapter in which he pictures some of the conditions which may obtain in 2,000 A.D. in view of the present rate of progress in flight. Among the most interesting items are some sample weather bulletins which may be issued some 90 years hence, and we reproduce one herewith :—

"The northern weather so far shows no sign of improvement. From all quarters come complaints of the unusual prevalence of sleet at the higher levels. Racing planes and digs alike have suffered severely—the former from unequal deposits of half-frozen slush on their vans, and the latter from loaded bows and snow-cased bodies.

"As a consequence, the northern and north-western upper levels have been practically abandoned, and the high flyers have returned to the ignoble security of the 300, 500, and 600 ft. levels. But there remains a few undaunted sun-hunters who, in spite of frozen stays and ice-jammed connecting-rods, still haunt the blue empyrean."

Military Status of Aeronautics.

OWING to the great pressure upon our space this week occasioned by the description of the aero engines exhibited at the Olympia Aero Show and other matter, we have been compelled to hold over from this week's issue the instalment of Major Squier's article on the "Military Status of Aeronautics."

Back Numbers of "Flight."

As a corollary to the enormous demand for the souvenir and Show numbers of FLIGHT, a very large number of inquiries continue to be received for back numbers. The publishers have pleasure in announcing that they have secured a few of the early issues, and any of our new readers who may wish to complete their sets may still obtain the first thirteen numbers for 1*s.* 9*d.*, post free, from the publishers, 44, St. Martin's Lane, W.C.

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LOW *v.* HIGH-POWERED FLYERS.*

By JOSÉ WEISS.

WE know that the work required to impart to a body any given speed amounts to a number of foot-pounds equal to one-half the produce of the mass of the body by the square of that speed.

I am quoting this elementary principle because it brings home to us very clearly that the very first condition required for raising an aeroplane, viz., its passage from standstill to flight speed, is purely a question of foot-pounds. No aeroplane can ever be raised (that is, in calm air) until the full number of foot-pounds enacted by the principle just quoted have been expended ; and it matters little how this is brought about, either by a falling weight or by running the machine down an inclined plane, or simply by the mere power of the engine.

But what I want to emphasise is that the above principle is only theoretical, and that it does not include the very important additional number of foot-pounds required to overcome the friction on the ground, and which depends entirely on the nature of that ground. So that a well-made machine, having ample power to fly, but depending only on its engine for raising itself, although quite capable of doing so on a good surface, might be utterly helpless on a bad one, in exactly the same manner as a cyclist, who could get up a pace of 25 miles on an asphalte track in a few seconds, could not reach a speed of ten on a ploughed field if he were to try the whole day. If, for instance, the Wright machine was placed on a light trolley fitted with good bicycle wheels, and if that trolley was running on asphalte, the falling weight and the rail could quite well be dispensed with, and the machine, in calm air, would leave the ground after a run of about 70 yds. Let us say the machine weighs, roughly, 1,000 lbs., and the speed, as taken from the published records, is 60 ft. per sec., and we have for $\frac{Wv^2}{2g}$ $\frac{1{,}000 \times 60^2}{64} = 56{,}250$ ft.-lbs. Taking, then, the 24-h.p. motor to yield an actual efficiency of no more than two-thirds, or 16-h.p., the time required for developing the above 56,250 ft.-lbs. is $\frac{56{,}250}{16 \times 550} = 6{\cdot}4$ secs., and the space covered $6{\cdot}4 \times 30 = 192$ ft. By using the falling weight, viz., 1,500 lbs. falling 20 ft., and supplying 30,000 ft.-lbs. — the work left for the engine is reduced to 26,250 ft.-lbs., which gives for time $\frac{26{,}250}{16 \times 550} = 3$ secs., and for space $3 \times 30 = 90$ ft.

This allows nothing for frictional loss or air resistance ; and still Wilbur Wright manages all right with his 70-ft. rail, showing that my figures for a start without the weights are well on the right side. In the total absence of wind, however, the shortness of the rail must cause, and does cause, an occasional mis-start.

It is very clear that there would be no need for launching appliances of any sort if we had for the start a perfectly smooth and hard surface on which the necessary speed could be reached with a minimum of frictional loss.

Now the question which presents itself is this : Do we want a machine capable of rising unassisted from any rough surface? The Voisin type is of this class, which I will call the high-power type. Or do we want a lighter machine requiring a minimum of power, but capable of rising from a perfect surface only? The Brothers Wright flyer belongs to this second class, which I will call the

* Paper read before the Royal Aeronautical Society of Great Britain, on Friday, March 26th, 1909.

low-power type. Both are feasible; it is for ourselves to know what we want to do.

Am I right in saying that one of the greatest drawbacks of the first class of machine is that, in order to overcome the initial resistance, they require a great stationary thrust which can only be obtained by a short pitch at high rotary speed. This involves direct coupling, and, consequently, small diameter propellers, giving a great thrust at the start, but a reduced one in flight on account of the slip. Hence a considerable waste of power. If, on the other hand, the starting ground be such as to cause very little resistance, we can use, by gearing down, large, long-pitched propellers with low rotary speed which give comparatively little thrust at standstill, but become highly efficient as soon as the machine is under way. This difference is probably the principal factor which enables the Wright Brothers to negotiate two passengers with only 25-h.p. just as easily as Voisin does with 50-h.p.

I pointed out in a paper read before this Society last year that the extreme difficulty which is encountered by all aviators in finding a suitable place for their experiments is an ample proof that when we come to real journeys through the air from one city to another the difficulty of finding a place fit for landing cannot be overcome until suitable aero-garages or depôts have sprung into existence, having a suitable ground to land and to re-start, and sheds to house the machines. We must remember that, barring roads and streets which are obviously useless, every scrap of land has a landlord whose rights cannot be overlooked. This being the case, and since it is quite simple to provide at the stations a suitable smooth surface, the advantage of a machine capable of rising from a rough surface is not so great as might appear at first sight. Even for war purposes it will be much safer for an army to carry with them some light, suitable launching arrangement than to rely on the off-chance of finding a suitable ground. Would it have been possible, for instance, to get off a Voisin machine from the rough veldt in the South African war? From the photos I have seen I should say it was very doubtful. It can be argued that in the case of a breakdown and consequent forced landing, a machine built to ascend only from a specially prepared surface would be stranded. Very probably it would, but the chances of the other class of machine of being better off are very remote. It would depend entirely over what sort of country the breakdown was to occur.

I believe that we should aim in the same direction as the Brothers Wright, that is, towards the low-power machine. But we might improve on their cumbersome and somewhat dangerous method of starting by simply providing our experimental grounds and our stations with a perfectly smooth and hard surface, made up of asphalte or cement, or even for economy's sake of a layer of fine cinders thoroughly levelled and firmly rolled down. A circle of, say, 100 yards in diameter would probably be ample for any machine capable of flying at all, and if placed in the centre of the ground this circle would permit of a start in any direction against the wind. This is, after all, not very much more than what is done for the average football or cricket club.

At the present stage of the whole question no new type can be said to be an advance on the existing ones unless it can accomplish the same performance either under greater compactness and simplicity, or with less power, or with a less amount of personal skill. In other words, the advance must be in the direction of greater efficiency of the planes and driving gear, and of more automatic stability. And a smooth surface for the start will facilitate efforts in that direction. For instance, if the start can be accomplished under easy conditions, a machine of the Wright type, built strictly for a single passenger, and, therefore, much smaller and lighter than the existing machines of that type, would only require a very slight increase of efficiency to be accommodated by an ordinary strong cycle motor, and we come in sight of a practical popular flyer. In another direction, although the construction of very large machines would, for lack of experience, be still fraught with considerable difficulty, it takes no great stretch of imagination to conceive a machine made to, say, three times the scale of the present Wilbur Wright flyer, that is, with a span of 120 instead of 40 ft. Such a machine would be a mere might in size and in cost as compared with the Zeppelin airship, although its capacity would be at least thirty passengers comfortably seated in a roomy and entirely closed carriage. Here, again, the first condition for such a machine is a suitable harbour, but if we suppose the existence of a properly fitted station at each end of the line, what stands in the way of a direct passenger service between Paris and London? I believe that this will be a reality before another three or four years have elapsed.

Ordinary depôts for landing and re-starting need not be very large. By the time we have become experts at driving our machines a clear space of half-a-dozen acres in an open neighbourhood will probably be found quite sufficient, but matters are very different for an experimental field on which to practise and learn how to ride. For this a very large tract of level and unbroken land is required if accidents are to be avoided. In France nearly all garrison towns possess a huge manœuvring field, which seems to answer the purpose admirably, but in this country such places do not appear to exist, and to the would-be aviator the finding of a suitable place for his experiments is the most vexing of already innumerable difficulties.

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CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

AN ENQUIRY FROM MAFEKING.

To the Editor of FLIGHT.

SIR,—Have just received copy of FLIGHT through our local newsagents here. Several of my friends, as well as myself, think highly of it, and intend to be regular readers of same. There is one question, or rather some information, perhaps you could assist me in, viz., could I obtain plans of a really good working model of an aeroplane, from where, and from whom could I purchase them? Kindly send particulars.

Wishing you every success in your new enterprise is the wish of

Yours, &c.,

C. A. POWER.

c/o A. Waddell & Co., Mafeking,
Bechuanaland, S.A. March 1st, 1909.

PROPOSED NATIONAL AVIATION EXHIBITION.

To the Editor of FLIGHT.

Sir,—Kindly permit me to thank Mr. Rankin Kennedy for his sensible and broad-minded remarks in your last issue. May I further request that you mention that since I (with others), found it impossible to complete my full-sized hélicoptère in time for Olympia, I have been negotiating, with some success, with the Crystal Palace authorities with a view to interest them sufficiently to grant space and accommodation for erecting and exhibiting full-sized machines, and possibly models, at the Crystal Palace, with the prospects of trials in their beautiful grounds. As far as the hélicoptère and ornithoptère types are concerned, personally, I consider that the aid of the Crystal Palace is not to be despised, and I sincerely hope that the Aeronautical Society, Aero Club, and kindred bodies will assist, by their members, in furthering these efforts to secure a permanent National Flying Exhibition, as the mutually helpful and harmonious working together of the aerodynamical scientist and the motorist should prove much to enhance the science of aviation, and who can foretell, the possible ultimate supremacy of England in the subjugation of the air.

I am, Sir, Yours faithfully,

EDGAR WILSON.

AERO SHOW, OLYMPIA.

To the Editor of FLIGHT.

SIR,—We think that the Society of Motor Manufacturers and Traders, Limited, and the Aero Club, are to be congratulated on the organisation of the first English Aero Show, and on the amount of business that has been transacted at same. Speaking for ourselves, we are glad to be able to say that we have sold to a prominent London gentleman the Delagrange aeroplane which was exhibited, and have also booked an order for replica of same. We are open to book further orders for early delivery, and to give a guarantee to fly, and at our aerodrome at Juivisy, near Paris, Mr. Delagrange will be pleased to give any information to intending purchasers, and to arrange for tuition, trial flights, &c.

We remain, yours faithfully,

For MASS CARS,
F. W. CLARK.

FLYING MACHINE CRITICISM.

To the Editor of FLIGHT.

SIR,—The statement made by Mr. Rankin Kennedy that "the men with money have made a rush for aeroplanes only, and have left the real developments along other lines to inventors who cannot get a hearing," is not quite correct. I have personal knowledge of at least half-a-dozen series of exhaustive experiments that have been carried out in recent years on lines other than the aeroplane. In

each case the inventors were backed up with adequate capital to properly develop the machines, but the mechanical difficulties met with in building full-sized machines were so serious that the experiments were abandoned; and this in spite of the fact that the inventions looked very encouraging "on paper."

The beauty of the aeroplane lies in its simplicity. It finds in the air a responsive medium. Already the criticism that it would be troublesome to start and dangerous to land has been proved false, as will, no doubt, be the statement that finality has been reached in its development, and that time and money will only be wasted in further research.

Yours faithfully,

Streatham. E. C. DWYER.

THE SUBJUGATION OF THE AIR.

To the Editor of FLIGHT.

SIR,—I am exceedingly sorry I cannot send photo. of full-sized machine, as I found it impossible to complete same in time for Olympia, and a smaller one on the wing principle (offered also full-sized), the S.M.M.T. did not care to substitute. The machine was intended to form an improvement on the full-sized hélicoptère I exhibited at Wembley Park in 1905, but I must at present be content with endeavouring to complete it in time for the Olympia show in July, but shall be happy to give details and photo. if you desire.

In reply to "Leo," the machine tested by Mr. Davidson in California lifted a weight of 3 tons at the expenditure of 80-h.p. by means of two large screws of original design 27 ft. in diameter each. This works out, say, at 75 lb. per h.p., but with the machine in forward motion or in high winds the lift is augmented at least 50 per cent. (*vide* Vogt in his Copenhagen experiments), and in fact will exceed that of the Wright's lift of 745 lb. per 8-h.p., at 20 miles per hour or 94 lbs. per h.p., claimed by them in their writings of their earlier experiments. The explanation lies in the fact that *active* surfaces are much more efficient than *passive*, whilst the stability is correspondingly higher; stability in short being of far greater importance than high lift.

Perhaps you will pardon me in pointing out to Mr. Montford Kay that the Hollands propeller has shown its superiority to the Voisin in the air as well as platform; the latter merely proves by laboratory experiment success when reduced to practice in flight. Being wholly constructed of high grade steel of hollow crescent section, and the tip narrower to the root of blade, in rapid rotation, the centres of pressures and mass are smaller, the radii being less than those of broader tipped blades, resulting in the least bending moment on the blades whilst the centrifugal force withstood exceeds that of the Voisin.

Referring to the extraordinary remarks of Mr. Dwyer *on an entirely erroneous assumption*, I should treat them with contempt were it not advisable to counteract a false impression to students of aviation. In the first place, having studied impartially and without bias the principles of aeroplanes, the ornithoptère, and the hélicoptère, my advice to Mr. Sandon Perkins—inviting further aid if he desires—would not have been given if I had not been sure of my ground. If Mr. Dwyer will rationally retrospect my letter he will find that I have not belittled Wright in the least, on the contrary, he has, I may add, my profound admiration for his achievements. Mr. Sandon Perkins asked for the *best way* for Polar exploration by dynamic flying machine aid, and, since the aeroplane system has dangerous limitations with regard to instability by reason of its large inert immoderate area, I could not conscientiously advise this system, whatever Mr. Dwyer's "insight" may be. The complex wing of nature is easily reproduced by man's methods.

Briefly, then, I will recapitulate my reasons. The fundamental laws demonstrated by nature and emphasised indeed by the incomplete aeroplane of to-day, show us that the *whole wing is utilised* to consumate the triple function of elevating, propelling, and sustaining. And, as Prof. Pelligrew has shown us, in addition to being structurally and functionally powerful propellers and elevators in beating or flapping in helicopteral flight, they have the "sail-area" or travelling surfaces reduced to apparently insufficient proportions. To accomplish the seemingly impossible feat of subjugating the conflicting air-currents, nature, well knowing that her children must subdue and not be subdued, increases the "sail-area" *by rapid motion* analogous to the screw, the result being that when driven at high speeds the wings *augment* the active area and practically convert the spaces through which they travel into *solid bases of support*, and driven at higher speed than the air-currents are superior to and control them by superior power, greater speed, and the inertia of the mass of the flying animal. *Ergo* man *must* adopt this law in order to secure natural or inherent and artificial stability. Moreover, the secret of the hélicoptère lies in the correct location of the centre of gravity now discovered by several students, and the "monstrous design" referred by Mr. Dwyer exists only in *his* limited knowledge of the aeroplane, whilst the Wright machine is still as unsafe and incapable of taking long voyages at will independent of weather now as ten years ago.

I am, Sir, &c.,

E. WILSON.

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AERO SHOW.—The balloon exhibited by the Continental Co. as an example of the use of their fabric. Its capacity is 50,250 cubic feet, and has been constructed for the Hon. C. S. Rolls.

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